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Determinants of Poverty among Arable Crop Farmers Using Sustainable Soil Management Techniques in Imo State, Nigeria

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ABSTRACT

Low income of the arable crop farmers is sine qua-non to abject poverty associated with most of the farmers; hence the study evaluated the determinants of poverty among arable crop farmers using sustainable soil management techniques (SSMT) in Imo State, Nigeria. Multi-stage random sampling technique was used to select 209 arable crop farmers for this study. Information on the objectives of this study was elicited from the sampled respondents through a well structured questionnaire. Data were analyzed using descriptive statistical tools, Foster-Greer Thorbeck (FGT) model and the Logit model. Results showed that the mean per capita consumption expenditure among the farm households was ₦360.30 ($1.81) with a poverty line of ₦240.20 ($1.21) per person, per day. The incidence of poverty among the farm households increased with advancing age of the household heads. Poverty headcount, gap and severity were 0.766, 0.614 and 0.713, respectively. Variables such as age of farmer, education, household size, access to micro credit, net farm income, extension contacts and participation in agricultural workshop were significant and important determinants of poverty levels among arable crop farmers in the area. Hence, polices on income savings, diversification and redistribution should be encouraged amongst the arable crop farmers to drive poverty reduction in the area.

Key words: Determinants; poverty; arable crop farmers; SSMT; FGT model

INTRODUCTION

Poverty depicts a lack of basic necessities of life intensified by insecurity, deprivation of well-being assests and vulnerability to shocks of climate change and food price fluctuations [1]. It is pervasive and manifests through social and pyschological deprivation from access to speech, decision making or accessement of cultural values, rights and freedom as well as the lack of dignity, self respect, security, justice and income which engender farmers using variant soil practices that are prone to land devastation and soil erosion. Hence, the poor adapts to shocks by using some copping strategies that are concomitant to soil degredation that reduced efforts of sustainable environmental management hence the quick spread of land degredation. Poverty is often associated with low income [2] and low standard of living. The concept has often been interpreted as lack of support in most Sub-Saharan African as the victims of poverty are often deprived from both material and non-material resources that can bring them close to better opportunities in life. A recent poverty assessment survey has shown that over 70% of the populations are living on less than a dollar per day and over 50% are living below the national poverty line. The survey also revealed that poverty is especially higher in rural areas where majority of the population are resident and derive their livelihoods from agriculture [3]. However, poverty level can be classified into absolute and relative poverty and the extent of absolute poverty can be defined as the number of people living below a specified minimum level of income which is one US Dollar, a day per person. While relative poverty on the other

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hand relates to the living standard of the poor to the standard that prevail elsewhere in the society [4]. Consequently, [3] stated that the poverty line and poverty index are the most widely used instruments in measuring poverty. Poverty line denotes the amount of income, which is the borderline between poor and non-poor Meanwhile, the international absolute poverty line for Countries of the World is one US Dollar per day and whoever lives below this prescribed amount is considered to be in extreme poverty [1]. The poverty measure used commonly to decompose poverty levels of the farmers is the Foster,Greer and Thorbecke (FGT) model. They are widely used because they are consistent and additively decomposable [5]. They are grouped into; poverty headcount or incidence, gap and severity. The poverty headcount index (P_0) measures the proportion of the population that is poor, that is the proportion whose income or consumption fell below the poverty line. The poverty gap index (P_1) measures the extent to which individuals fall below the poverty line (the poverty gaps) as a proportion of the poverty line. The sum of these poverty gaps gives the minimum cost of eliminating poverty, if transfers were perfectly targeted. The poverty severity index (P_2) (squared poverty gap) measures the intensity or severity index of the poor from the poverty line. It indicates the severity of poverty by giving larger weight to the extremely (core) poor. This is done by squaring the gap between their expenditure and the poverty line. A lot of empirical literature has examined the determinants of poverty in Imo State, but none has evaluated the determinants of poverty among arable crop farmers using sustainable soil management techniques, hence the need for this study.

MATERIALS AND METHODS

This research was conducted in Imo State of Nigeria, which is located in the South Eastern part of Nigeria with a land area of 5,530 sqkm. The State lies between latitudes $4^0 45^1$N and $7^0 15^1$N and Longitudes $6^0 50^1$E and $7^0 25^1$E. The State shares boundaries with Abia and Cross Rivers State to the East, Delta State to the West, Rivers State to the South and Enugu and Anambra State to the North. The State has Owerri as its capital and made up of 27 (twenty-seven) Local Government Areas which are grouped into three agricultural zones namely Owerri, Orlu and Okigwe. Farming is the predominant occupation of the rural inhabitants. Multi-stage sampling technique was used for this study. In the first stage, two local government areas (LGAs) were purposively selected from each of the three agricultural zones of the State namely (Owerri, Okigwe and Orlu). The selection of these LGAs was based on their predominant agricultural activities and use of sustainable soil management techniques (SSMT). The LGAs selected were Ngor-Okpala and Ohaji-Egbema from Owerri zone, Nwangele and Isu from Orlu zone while Isi-ala Mbano and Obowo were selected from Okigwe zone respectively. A total of six (6) local government areas were used for this study. The second stage involved a random sample selection of arable crop farmers from the list of registered arable crop farmers using SSMT, kept with the zonal ADP's in each of the selected LGAs from the various zones of the State. Owerri zone has 122 registered arable crop farmers while Orlu and Okigwe zones have 130 and 109 arable crop farmers. This shows that there are unequal numbers of arable crop farmers across the three zones; hence an equal representation of sample was made from a proportion of 70 percent of the total population from each zone. This gave a sample size of 85 for Owerri zone, 91 for Orlu zone and 76 for Okigwe zone giving a total of 252 arable crop farmers across the six LGAs. However, the study eventually used only 209 valid questionnaires for analysis. Data were analyzed using descriptive

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statistical tools, Foster-Greer Thorbeck (FGT) model and the Logit model.

Foster-Greer Thorbeck (FGT) model is expressed as:

$$P_\alpha = \left\{ \int_0^z \left[\frac{(z-y)}{z}\right]^\alpha \rightarrow f(d)\delta y \right. \text{ ----- (Eqn.1)}$$

Where Y is consumption expenditure , Z is the Poverty line, Pα is the poverty index with α as 0,1 and 2 representing poverty headcount, gap and severity respectively. f(d) is the population density function of expenditure.

$$\textbf{MPCE} = \frac{THCE}{HHSZ} \text{ ------ (Eqn.2)}$$

Table 1: Estimated poverty line

MPCE	₦360.30 ($1.81)
Poverty Line	₦240.20 ($1.21)
Mean Household Size (6 persons)	₦40.03 ($ 0.20)

Source: Computed from Field survey data, 2015.

Table 2: Estimated poverty profile of arable crop farmers

Variables	Poverty Headcount	Poverty Gap	Poverty Severity
Gender			
Male	0.310	0.079	0.028
Female	0.235	0.060	0.018
Age			
20-29	0.276	0.210	0.028
30-39	0.391	0.292	0.218
40-49	0.472	0.310	0.476
50-59	0.599	0.491	0.512
60-69	0.604	0.567	0.609
70-79	0.766	0.614	0.713
Education			
No Formal	0.801	0.724	0.513
Primary	0.711	0.622	0.412
Secondary	0.602	0.217	0.082
Tertiary	0.349	0.148	0.060
Marital Status			
Married	0.418	0.329	0.190
Single	0.276	0.126	0.176
Household Size			
1-5	0.318	0.184	0.169
6-10	0.564	0.443	0.395
11-15	0.667	0.512	0.470
Occupation			
Farming	0.719	0.612	0.416
Non-Farming	0.341	0.226	0.191

Source: Field survey data, 2015.

ISSN: 0975 - 4539
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Table 3: Estimated determinants of poverty among arable crop farmers

Variables	Parameters	Coefficients	t-values	Std Err
Constant	b_o	0.0814	1.3012	0.0354
Age of farmer	b_1	0.6692	2.7011***	0.2478
Education	b_2	-0.0942	-3.7903***	0.0245
Household size	b_3	0.7631	2.2201**	0.3437
Farming as a major occupation	b_4	0.0212	1.0394NS	0.0203
Per capita expenditure of farmers	b_5	0.6714	2.0486**	0.3277
Access to micro credit	b_6	-0.5766	-2.8601***	0.2016
Participation in agricultural Workshop	b_7	-0.0612	-4.2248***	0.0145
Extension contacts	b_8	-0.6671	-3.0414***	0.2193
Net farm income	b_9	-0.1447	-2.4001**	0.0603
Farming experience	b_{10}	-0.0833	-1.0564NS	0.0789
Interest on borrowed capital	b_{11}	0.0511	1.0185NS	0.0502
Farm size	b_{12}	-0.7654	- 1.1422NS	0.6701
SSMT	b_{13}	-0.0968	- 3.0543***	0.0317
LR (χ^2)		196.93***		
Log likelihood		-132.33		
Pseudo (R^2)		0.7613		
n		209		

Source: Computed field survey data, 2015

Note: ***; ** indicates statistically significant at 1 percent, and 5 percent respectively. NS indicates non-significant.

The poverty line or threshold (Z) is the minimum level of income deemed necessary to achieve adequate standard of living in a given society [6]. This is shown as the mean per capita consumption expenditure (MPCE), which becomes a relative standard for poverty line usually measured as two-third of the MPCE of the household in the population under study. It is estimated using the total household consumption expenditure (THCE) which is an aggregate total expenditure on utility, service, food and durable assets of the household relative to the household size (HHSZ).

The Logit model is explicitly specified as follows;

Log (P/1-P) = F (X_i, B) + e --- (Eqn.3)

Where:

P = Probability that a farmer is poor, while (1–P) is the probability that a farmer is not poor

B = Vector of estimated parameter

X_i = Independent variables considered, which include;

X_1 = Age (Years)

X_2 = Education (No of years spent in school)

X_3 = Household size (No. of persons)

X_4 = Occupation (Farming =1, otherwise =0)

X_5=Per capita expenditure of farmers (Naira/person)

X_6= Dummy variable indicating whether a farmer has access to micro-credit or not (Accessible =1, otherwise =0)

X_7 = Participation in agricultural workshop (No of times participated)

X_8 = Extension contacts (No. of visits)

X_9 = Net farm income (Naira)

X_{10} = Farming experience (No. of years spent on arable crop production)

X_{11} = Interest on borrowed capital (Naira)

X_{12} = Farm size (Hectare)

X_{13} = SSMT (Proportion of SSMT used by the farmers)

e = error term

RESULTS AND DISCUSSION

Poverty line of the arable crop farmers

The estimated poverty line of the arable crop farmers is presented in Table 1. The Table

depicts the estimated poverty line of the arable crop farmers which was based on per person, per day. Results showed that the mean per capita consumption expenditure among the farm households was ₦360.30 ($1.81) while the poverty line was ₦240.20 ($1.21) per person, per day. This implies that the farm households were living on ₦240.20 ($1.21) per person, per day. This differs from the findings from [7] which reported different poverty lines across arable farm households. This amount could be too low to meet the daily needs of the entire farm household heads. Moreover, considering the poverty line obtained and the mean household size of 6 persons per household, these values ₦240.20 ($1.21) and ₦40.03 ($0.20) were lower than the international poverty threshold of ($1.25) per person, per day for people living in Sub-Saharan Africa and Asian countries as viewed by [2]. The results tend to suggest problems of food insecurity among poor farm households. In other words these amounts may not be able to meet the minimum daily calorie in-take of 2250 Kcal required per person per day. Hence, any household spending less than the amount obtained above on consumption is described as being poor while any other household spending exactly the stipulated amount or higher than that on consumption imply that the respondent is non-poor.

Note. The Dollars equivalents were given in parenthesis. The exchange rate was ₦199 per US Dollar in 2015.

Poverty profile of arable crop farmers in Imo State

The estimated poverty profile of the arable crop farmers are presented in Table 2. The Table shows that the poverty profile of the arable crop farmers is distributed across their socio-economic characteristics in the area. The Table reveals that poverty headcount, gap and severity were found to be higher amongst male headed households with values 0.310, 0.079 and 0.028 relative to female headed households with values; 0.235, 0.060 and 0.018 respectively. This results though contrary to popular opinions agreed with the findings from; [8]. The reason for the above is because majority of the female headed households engaged in secondary occupation such as trading which tend to generate additional income for the household consumption expenditure. The poverty headcount indicated that 31% of the male headed households were below the poverty line while 23.5% of the female headed households fell below the poverty line. The Table shows that, 27.6 percent of the households whose heads are below 29 years are poor. This refers to the proportion whose income or consumption fell below the poverty line. Moreover, the incidence of poverty among the farm households increased with advancing age of the household heads. The poverty gap and severity were 0.614 and 0.713 respectively. This implies that the more farm household heads increase in age, the more decline in their productivity and its consequent low income. This finding is consistent with *a priori* expectations and in line with the findings from [8] which reported that ageing farmers are known with low productivity and more prone to poverty. Similarly, the poverty headcount, gap and severity were higher in households with no-formal education and least among households with post secondary education. From the results, the poverty headcount shows that 80.1% of the households head with no-formal education were poor, 71.1% with primary education were poor, 60.2% of the households head with secondary education were poor while 34.9% of the households head with post secondary education were in poverty with a corresponding poverty gap and severity of 0.148 and 0.060. The result

showed that the incidence of poverty and its gap and severity decreases with increase in level of education. This finding is also consistent with [9] who reported that as the level of education of the farmers increased their poverty level decreased. The result also reveals that headcount, gap and severity of poverty appear higher with values 0.418, 0.329 and 0.190 in households whose heads are married than in households whose heads are single. This means that households whose heads are married are more vulnerable to poverty than the households whose heads are single. Households whose heads are married are often considered to be more vulnerable to poverty because of their tighter time schedule and income constraints than the households whose heads are single. Their vulnerability may partly be as a result of lack of access to or low productive resources, education, credit, and decision making forums. This finding is consistent with *a priori* expectations and supports the findings from [10]. The result also revealed that increase in household size results in increase in the poverty levels among the households with the headcount, gap and severity highest with values 0.318, 0.184 and 0.169, respectively for households whose size ranges between11-15. Results showed that as the household size increased, the extent of poverty as well as their contribution to the whole group poverty also increased. The reason may be attributable to the fact that increased household size implies more dependants who rarely contribute to household income. Findings are however synonymous with [11]. Therefore, policies to tighten up poverty amongst these farm households should include those to reduce household size or give them enhanced empowerment relative to others. The result further indicate a high prevalence of poverty amongst the farming households compared to the non-farming households, with higher values, 0.719, 0.612 and 0.416, in headcount, gap and severity. This implies that the non-farming households recorded lower poverty prevalence. This stems from the fact that non-farming household heads derive income from diverse income sources. Diversification as a source of income growth is a potential means of poverty reduction. This finding is also consistent with those of [8].

Estimated determinants of poverty among arable crop farmers in Imo State

The estimated determinants of poverty among arable crop farmers are presented in Table 3. The likelihood ratio was 196.93 which was highly significant at 1 percent probability level and thus confirms the fitness of the model. The coefficients of farming as a major occupation, farming experience, interest on borrowed capital, and farm size were not statistically significant even at 10 percent probability level. A significant positive relationship was detected between the age of the household heads and poverty level. The positive relationship of age to poverty level could be attributed to the fact that as farmers advance in age, their productivity declines which leads to decreased level of income and thus, increases the probability of being poor. This lends credence to *a priori* expectations and consistent with the findings from [12]. Their findings reveals that age of the farmers were found to be positively related to the poverty status indicating that as the farmers grows older, the probability of being poor also increases. The coefficient of education showed a significant negative relationship with poverty level. The negative relationship implies that the higher the level of education attained, the lower the probability of the farmers being poor. This finding is consistent with *a priori* expectations. Education is vital for boosting the productivity of the human factor and making people more aware of

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opportunities for earning a living or income generation from non-farm sources. The coefficient of household size showed a significant positive relationship with poverty level. The positive relationship implies that the larger the household size the higher the probability of the farmers being poor. This finding is also consistent with *a priori* expectations and conforms to the findings of [12] who reported that the larger the household size, the higher the probability of the farm households being poor. This is because more of the household members are likely to be children who are unproductive, that is contribute less to family income and yet take a big proportion of household income in terms of school fees, medical bills, food and clothing. The coefficient of per capita expenditure of farmers was positive and significant at 5 percent level of probability indicating a direct relationship between this variable and the poverty level of the farmers. The positive relationship implies that the higher per capita expenditure of the farmers, the higher the probability of the farmers being poor. This finding is consistent with *a priori* expectations and conforms to the findings from [13] who reported that a unit increase in per capita expenditure of the farmers raises their poverty level. The coefficient of access to micro-credit showed a significant negative relationship with poverty level. The negative relationship implies that the higher the farmers' access to micro-credit, the lower the probability of the farmers being poor. This is in line with general believe that credit is an anti-poverty strategy because of the important role it plays amongst the rural populace. Credit assists the farm households in the purchase of farm inputs such as fertilizer, herbicides, improved seeds and investment demand which will ultimately increase their productivity and in turn aid the households to escape from poverty. Therefore a unit increase in credit access by farm households will increase the probability of the households being non-poor. The coefficient of participation in agricultural workshop was negative and significant at 1 percent. The negative relationship implies that the more farmers participate in agricultural workshop the lower the probability of the farmers being poor. This result agrees with *a priori* expectations and the findings from [14] who posited that regular participation in agricultural workshop tends to provide farmers with reliable information on a wide range of agricultural technologies. The frequency of participation in agricultural workshop is very crucial as it guides the farmers on new farm practices which enhances the output and income of the farm households. The coefficient of extension contacts showed a significant negative relationship with poverty level. The negative relationship implies that the higher the number of visits made to the farmers the lower the probability of the farmers being poor. Thus exposure to new farming techniques and good farm management principles enhances farm productivity and very useful in ameliorating rural poverty. Extension services provide informal training that helps to unlock the natural talents and inherent enterprising qualities of the farmer, enhancing his ability to understand and evaluate and adopt new production techniques leading to increased farm productivity which reduces poverty. This conforms to *a priori* expectations and supports the findings from [15].

The coefficient of net farm income was negative and significant at 5 percent level of probability implying an inverse relationship between net farm income and the poverty level of the farmers. The negative relationship implies that the higher the net farm income of the farmers the lower the probability of the farmers being poor. This result is in

conformity with *a priori* expectations and also supports the findings from [9] who reported that an increase in net farm income lowers the probability of the farmers being poor. Hence, net farm income empowers arable crop farmers to take good care of their family members and purchase essential farm inputs such as fertilizers, pesticides, improved seedlings etc. The coefficient of sustainable soil management techniques was negative and significant at 1 percent level of probability. The negative relationship implies that the higher the use levels of the sustainable soil management techniques the lower the probability of the farmers being poor. The use of sustainable soil management techniques increases farmer's productivity with a resultant increase in income which reduces their poverty levels.

CONCLUSIONS

The findings of the study showed that the mean per capita consumption expenditure among the farm households was ₦360.30 ($1.81) while the poverty line was ₦240.20 ($1.21) per person, per day. This implies that the farm households were living on ₦240.20 ($1.21) per person, per day. The result showed that the incidence of poverty and its gap and severity decreases with increase in level of education. Variables such as age of farmer, education, household size, access to micro credit, net farm income, extension contacts and participation in agricultural workshop were significant and important determinants of poverty level among arable crop farmers in the area. Hence, polices on income savings, diversification and redistribution should be encouraged amongst arable crop farmers to drive poverty reduction in the area.

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